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A NEW SPECIES OF CLUPEID FISH (PISCES: PRISTIGASTERIDAE) FROM NORTHERN AUSTRALIA AND PAPUA

PATRICIA J. KAILOLA
Department of Zoology, University of Adelaide, Adelaide, SA 5000, Australia

ABSTRACT

Ilisha lunula sp.nov., a clupeid species from northern Australia and Papua is described. The new species is distinguished from other species of *Ilisha* by its long caudal fin lobes. Comparison is made with four other congeners possessing paired post-coelomic swimbladder extensions.

KEYWORDS: taxonomy, Pristigasteridae, *Ilisha*, northern Australia, Papua.

INTRODUCTION

Ilisha Richardson and *Pellona* Valenciennes are superficially similar genera within the clupeid family Pristigasteridae (Whitehead 1986). They share such characters as a prominent lower jaw and a long-based anal fin, but can be separated from each other on the presence (*Pellona*) or absence (*Ilisha*) of a toothed hypomaxilla. More satisfactory identification of Indo-Pacific *Ilisha* has prompted several recent reviews and synopses (Whitehead 1973; Seshagiri Rao 1972, 1973, 1976; Ramaiyan and Whitehead 1975; Ramaiyan and Natarajan 1979; Wongratana 1980). When Wongratana (1983) described two new species from the Arabian Sea and India, the complement of valid Indo-West Pacific *Ilisha* rose to 11 (including the valid *I. sirishtai* Seshagiri Rao, 1975). All of these species occur in an area bounded by the Persian Gulf, India, China and Japan, Borneo and Java. In addition, two species occur in the New World, and one off the coast of West Africa.

Specimens referable to *Ilisha* first came to my notice in 1982. They had been trawled off northern and northwestern Australia during an exploratory fishing programme conducted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Initially, the specimens appeared distinct from known species of *Ilisha* by their colouration and long tail. Additional material from Papua and Eastern Australia was later found in museum collections. Examination of a series of specimens, and comparison with material of related species, revealed other substantial differences which confirmed the northern Australian species as new.

A number of characters distinguish species of the genus *Ilisha*. Seshagiri Rao (1972) recognised two different frontal bone striation (ridge) patterns in *Ilisha*. This character has subsequently been rather widely used for species identification, although Ramaiyan and Natarajan (1979) claimed discrepancies in the striae pattern described for *I. melastoma* (Schneider), and T. Wongratana (pers. comm.) found it inadequate to separate species of *Ilisha*. Relative chin depth, a character introduced by Seshagiri Rao (1973) to distinguish *I. megaloptera* (Swainson) from *I. melastoma*, was however, left unexplained and unquantified. The pattern of scale striation is a taxonomically valuable character (Seshagiri Rao 1973), but the form of the pseudobranch (Seshagiri Rao 1974a) and arrangement of the gillraker setae (Seshagiri Rao 1974b) are less so. An axillary pelvic scale is either absent (see Seshagiri Rao 1973; Ramaiyan and Natarajan 1979) or present (as in *I. pristigastroides* (Bleeker), *I. kampeni* (Weber and de Beaufort), *I. striatula* Wongratana, *I. obfuscata* Wongratana). All of the species I examined have an edentulous space at the symphysis of the lower jaw, which is narrow in *I. kampeni, I. striatula* and *I. melastoma,* but comparatively wide in the new species.

Ramaiyan and Natarajan (1979) assessed the taxonomic value of some of these characters, adding colour, otolith shape and vertebral number. Wongratana (1983) considered the number and length of the pyloric caecae a good character, and again emphasised the importance of colouration.

Detailed study of the Australo-Papuan specimens and comparison with related forms, has revealed differences in the

number of dorsal rays, predorsal scales and gill rakers, pattern of the scale striations, the number and length of the pyloric caecae and the length of the posterior extensions to the swimbladder.

On the basis of these differences, a new species of *Ilisha* is proposed. In this paper, I describe the new species and compare it with the four most closely-related species of *Ilisha: I. melastoma, I. kampeni, I. striatula* and *I. obfuscata*.

The format and terminology used in the description follow Whitehead *et al.* (1966), Seshagiri Rao (1972), Seshagiri Rao (1974a) and Ramaiyan and Natarajan (1979). Chin (or lower jaw) depth is an oblique measurement from upper to lower surface at the level of the symphysis. Where different from the holotype, the measurements for the paratypes are indicated in parentheses following the holotype data. These trawl-caught specimens are not in perfect condition; most fins are tattered to some extent and scales have been dislodged; the pectoral and pelvic fins could not be measured in some specimens.

Fig. 1. *Ilisha lunula* holotype, lateral view, 142.5 mm SL.

Material is deposited in the Australian Museum, Sydney (AMS); British Museum (Natural History), London (BMNH); California Academy of Sciences, San Francisco (CAS); Ian S.R. Munro Ichthyological Collection, CSIRO, Hobart (CSIRO); Northern Territory Museum, Darwin (NTM); and the Fisheries Research Division Laboratory at Kanudi, Port Moresby, Papua New Guinea (KFRS).

SYSTEMATICS

Ilisha lunula sp.nov.

(Figs 1-3, Table 1)

Ilisha sp. Gloerfelt-Tarp and Kailola, 1984: 48, 49, 302; Sainsbury, Kailola and Leyland 1985: 64, 65, 332.

Type material. HOLOTYPE - CSIRO, B.4111, 142.5mm SL, Arafura Sea, 11°43′S 136°18′E, bottom trawl from RV "Soela", 24 m, CSIRO, 24 June 1981. PARATYPES - CSIRO B.2104, 11 specimens, 114-157 mm SL, Timor Sea - Joseph Bonaparte Gulf, 14°08′S 128°34′E, bottom trawl from RV "Soela", 42 m, CSIRO, 29 June 1980; BMNH 1982.7.20:184-195, 12 specimens, 99-162mm SL, 14°08′S 128°34′E, bottom trawl from RV "Soela", 19 m CSIRO, 18 November 1980; NTM S.10203-002, 4 specimens, 57-79 mm SL, King Creek, Shoal Bay, 12°21′S 131°00′E, trawl, N.T. Fisheries, no date; NTM S.10404-003, 4 specimens, 70-79 mm SL, King Creek, Shoal Bay, 12°21′S. 131°01′E, trawl, N.T. Fisheries, 2 February 1974; BMNH 1982.7.20:196-216, 20 specimens, 110-159 mm SL, Arafura Sea, 11°04′S 131°18′E, bottom trawl from RV "Soela", 35 m, W. Okera, 6 July 1980; NTM S.10095-007, 1 specimen, 139 mm SL, Chambers Bay, Van Diemen Gulf, 12°13′S 131°35′E, trawl, 5-10 m, N.T. Fisheries, 5 May 1977; NTM S.10051-007, 1 specimen, 140 mm SL, 13 km west of Murganella Creek, 11°52′S 132°31′E, trawl, 14-18 m, N.T. Fisheries, 26 October 1977; AMS I.21962-004, 1 specimen, 163 mm SL, Arafura Sea, 11°50′S 134°48′E, bottom trawl from RV "Soela", 19m, CSIRO, 18 November 1980; CSIRO B.2105, 6 specimens, 136-168 mm SL, Arafura Sea, 11°43′S 136°18′E, bottom trawl from RV "Soela", 24 m, CSIRO, 24 June 1981; AMS I.15557-023, 1 specimen, 114 mm SL, Gulf of Carpentaria, 17°00′S, 140°14′E, bottom trawl, 14 m, I.S.R. Munro, 9 September 1963; AMS IB.3159, 1 specimen, 85 mm SL, Bynoe River mouth, Gulf of Carpentaria, 17°56′S 140°51′E, field stn 2715, no date; NTM S.11676-001, 2 specimens, 135 and 142 mm SL, Orokolo Bay, Papua, 7°58′S 145°18′E, bottom trawl, 37-

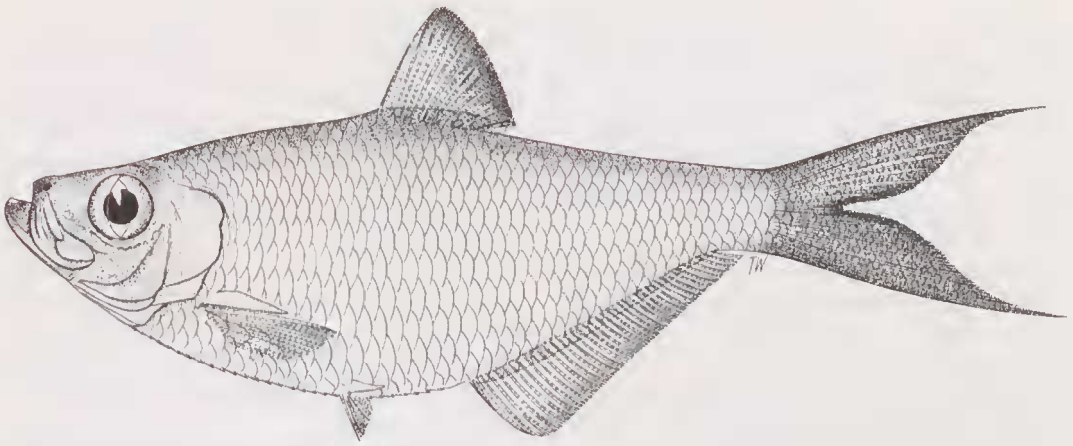

Fig. 2. *Ilisha lunula* paratype,NTM S.10095-007, from Chambers Bay, Van Diemens Gulf 139 mm SL, drawn by T. Wongratana.

47 m, S. Frusher, 25 September 1976; KFRS unreg., 1 specimen, 121 mm SL, Freshwater Bay, Papua, 8°12′S 146°35′E, bottom trawl, 15 m, S. Frusher, 25 August 1976; AMS IB.1268, 7 specimens, 30-43 mm SL, Mackenzie Island, Fitzroy River estuary, 23°31′S 150°52′E, G.P. Whitley, 19 March 1943.

Comparative material. *I. melastoma:* BMNH 1975.3.20:769-801 (in part), 6 specimens, 106-127.5 mm SL, Bolar, Mangalore, India (west coast); *I. kampeni:* BMNH 1979.8.24:154-155, 2 specimens, 94 and 96 mm SL, Kotabaru fish market, Kalimantan, Indonesia, 25 June 1978; *I. striatula*: BMNH 1975.3.20:673-679, 6 specimens, 140.5-158 mm SL, Waltair near Vizakapatnam, Andhra Pradesh, India; *Pellona ditchella* Valenciennes: NTM S.11346-003, 1 specimen, 122 m SL, Teluk Awang, Lombok, Indonesia, August 1984.

Diagnosis. A species of *Ilisha* with symmetrical paired post-coelomic extensions of the swimbladder on either side of the haemal spines, vertical scale striae overlapping or joining at the scale centre, 14-17 pre-dorsal scales, a total of 18-20 dorsal rays, 18-20 lower gillrakers, caudal fin lobes with extended tips - their longest rays about 4-7 (mean 5) times length of the middle rays, dark margin to all of caudal fin, 19-24 long pyloric caecae, and frontal bones with two prominent ridges in the "megaloptera" pattern.

Description. Branchiostegals 6; dorsal-fin ray total 17 (13-16, of iii-iv, 15-17); pectoral-fin rays 17 (16-18); pelvic-fin rays 6 (7); anal-fin rays 44 (41-46); gillrakers 11 + 19 (9-12 + 18-20); scutes 19 + 9 (18-22 + 8-10); scales in lateral series 44 (41-46); pre-dorsal scales 16 (14-17); number of vertebrae - (in 4 paratypes: 43-45).

In percentages of SL: body depth 34.9 (32.8-39.2); head length 26.1 (25.4-27.9); snout length 8.1 (7.1-8.5); eye diameter 8.5 (7.8-9.7); length of upper jaw 12.8 (12.6-14.6); length of lower jaw 13.1 (12-14.1); pectoral-fin length 17.8 (16.1-20.4); pelvic-fin length 6 (5.8-7.2); length of anal-fin base 37 (33.6-39.9); pre-dorsal distance 47.5 (45.5-50.1); pre-pectoral distance 26 (25.2-29.1); pre-pelvic distance 44.3 (43.5-51.3); pre-anal distance 60.2 (57.6-68); pectoral-pelvic interspace 19.3 (19.1-24.8); pelvic-anal interspace 16.9 (14.9-21).

Body strongly compressed, its depth greater than head length; belly sharply keeled. Dorsal body profile slightly convex to almost straight, ventral profile moderately to very convex (Fig. 2). Snout slightly shorter than eye diameter; lower jaw (chin) strongly projecting and deep, its depth 3 (2.5-4.4, mean 3.1) in eye diameter. Single, short row of small, curved conical teeth in each jaw at either side of edentulous symphysis; no hypomaxilla; small granular teeth on tongue; two supramaxillae - first (anterior) slender, ovate; second strongly tapered anteriorly, expanded posteriorly; ventral premaxillary and maxillary margins finely serrated, their bones separated by a smooth ligament. Maxilla reaches to vertical from front margin of pupil or slightly further.

Frontal bones with prominent ridges usually of the "megaloptera" pattern (see

Seshagiri Rao 1972), i.e. with pair of ridges arising on median line near nostrils and gradually diverging posteriorly, and second pair of ridges arising from opposite anterior eye border parallcling first pair, ridges of each side joining at hind end of skull (Fig. 3a).

Pseudobranchiae 12-20, half to two-thirds of their length concealed by membrane Gillrakers slender, slightly longer than gill filaments; numerous fine serrae distributed over all of gillrakers, though sparser toward tip. Pyloric caecae very long, about 19-24. Swimbladder prolongations extend to between level of anal fin origin (small fish) or 37th anal ray.

Scutes begin well forward on isthmus; cycloid scales crossed by 0-2 unbroken vertical striae in exposed portion, by 4-6 mostly overlapping interrupted striae (or anterior 1-2 unbroken) in unexposed portion (Fig. 3b).

Dorsal fin begins one eye diameter nearer to snout tip than to tail base; pectoral fin not reaching pelvic-fin origin, both fins with axillary scale; pelvic-fin base slightly nearer to anal-fin origin than to pectoral base; anal origin opposite middle or posterior third of dorsal fin. Caudal fin deeply forked, lobes slender, tips attenuated such that expanded fin is strongly lunate; undamaged filamentous caudal rays 4.3 (3.8-6.8, mean 5) longer than middle rays.

Colour (fresh). Silvery, upper back and top of head olive brown; snout and chin brown. Golden lustre on operculum, cheeks and temporal region; silvery streak from head to upper caudal peduncle. Pectoral fin golden; dorsal and caudal fins dusky yellow, dorsal tip and all of caudal-fin margin dark brown or charcoal.

Colour in preservative. Yellowish fawn; upper sides and abdominal region tan, top of head and back down midline brown, scales finely stippled and margined brown. Elongate-oval brown-stippled blotch on operculum; paired brown spots on parietal region of head; snout and chin dark brown or charcoal. Dorsal, pectoral and pelvic fins pale yellow, the former two finely dusted with brown; extreme tip of dorsal rays black; caudal fin yellow, its upper, lower and hind margins dark brown or charcoal.

Comparisons. *I. lunula* is characterised by having long caudal fin lobes. Specimens of *I. elongata* (Bennett) from China (CAS SU28168) also have produced caudal lobes (T. Wongratana, pers. comm.). However, *I. elongata* is otherwise easily distinguished from *I. lunula* by having only one post-coelomic swimbladder extension (two in *I. lunula*), 22-23 lower gill rakers (v. 18-20), 17-20 pre-dorsal scales (v. 14-17), 24-25+12-14 scutes (v. 18-22+8-10), 47-52 anal rays (v. 41-46), 16-18 dorsal rays (v. 18-21) and body depth 28.5-33% SL (v. 33-39).

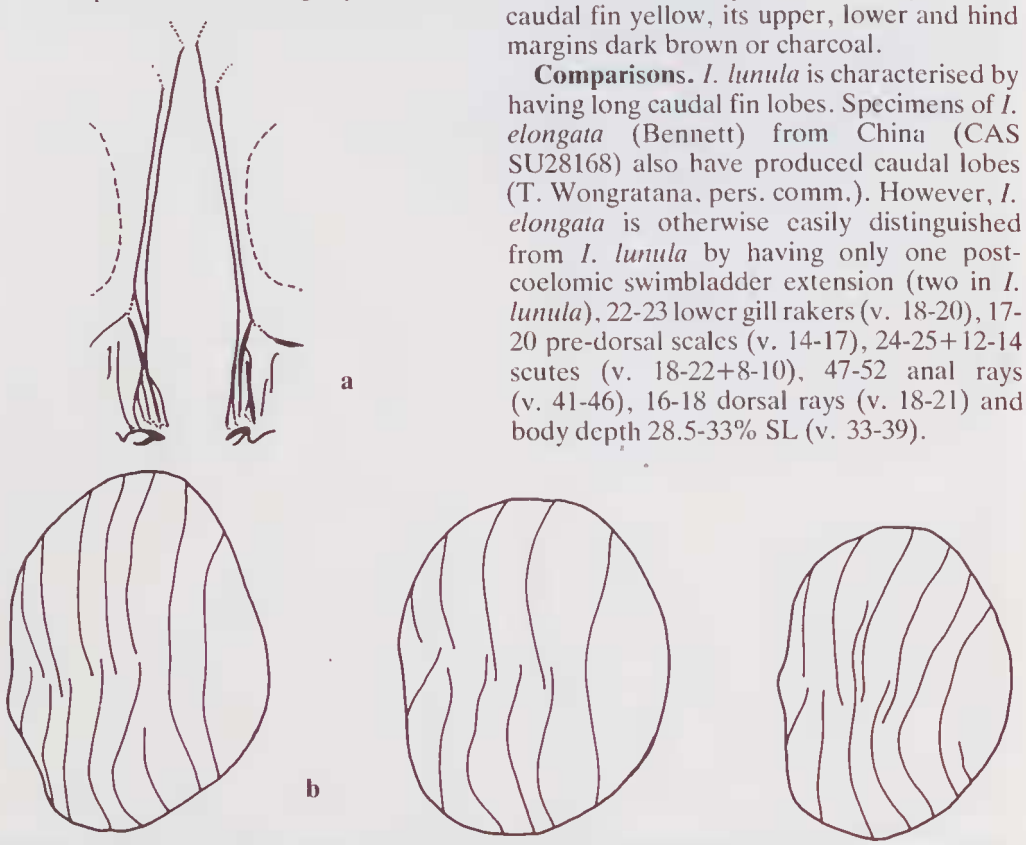

Fig. 3. *Ilisha lunula:* **a**, frontal ridges showing "megaloptera" pattern; **b**, scales from side of body above anal fin origin showing striation pattern, x4.

Species of *Ilisha* can be separated primarily into three groups depending on the presence and/or number of post-coelomic extensions to the swimbladder: *I. novacula* Valenciennes [Wongratana has found this is a senior synonym to *I. sladeni* (Day)] and *I. sirishai* (see earlier comment) lack post-coelomic swimbladder extensions; *I. pristigastroides, I. filigera* (Valenciennes), *I. elongata*, *I. macrogaster* Bleeker and *I. megaloptera* possess a single post-coelomic extension on the right side; and *I. melastoma, I. kampeni, I. striatula* and *I. obfuscata* have paired post-coelomic extensions.

I. lunula falls into the last group, but can be easily distinguished from the other four species of the group by having long, fully dark-margined caudal lobes. Of the other species which have paired post-coelomic extensions to the swimbladder, *I. striatula* (Bay of Bengal; Indonesia) has fewer predorsal scales, a shorter snout and upper jaw, slightly longer anal base, shorter and many more pyloric caecae, a different pattern of frontal ridges, vertical scale striae discontinuous at scale centre - separated by a wide space - and a dark band along the flanks; *I. obfuscata* (southern India) has a higher number of gill rakers and shorter swimbladder extensions; *I. kampeni* (India; Indonesia) has fewer vertebrae and slightly fewer lateral scale rows, a more slender body, longer lower jaw, pseudobranchiae almost covered by membrane and vertical scale striae not overlapping; and *I. melastoma* (Persian Gulf to western Indonesia; Taiwan) has a few more gillrakers, fewer predorsal scales, many more pyloric caecae and a faint dark band along the upper sides. *I. lunula* was previously misidentified by Whitehead and Wongratana (1984) as *I. melastoma*.

Table 1. Comparison of meristic and morphological characters in species of *Ilisha* with paired post-coelomic swimbladder extensions. Table compares data from both literature and specimen examination. (**Note:** *I. obfuscata* data given below).

Character	*I. lunula*	*I. striatula*	*I. melastoma*	*I. kampeni*
dorsal fin rays	iii-iv,15-17	iii-iv,12-15	iii-iv,12-15	iii-iv,13-14
anal fin rays	41-46	43-47	36-48	36-44
pectoral fin rays	16-18	15-17	15-17	15-16
gill rakers	9-12+18-20	8-12+19-22	10-14+19-25	7-9+19-25
scutes	18-22+8-10	17-20+7-8	18-22+7-10	18-21+7-9
lateral scale rows	41-46	42-45	39-44	38-43
transv. scale rows	13-16	12-15	11-13	12-13
predorsal scales	14-17	11-15	11-15	14-18
Vertebrae no.	43-45	42-43	42-44	41-42
%SL body depth	33-39	32-39	30-42.5	24-32
%SL pect. fin length	16-20.5	18-21	17-21.5	14.5-18.5
%SL snout length	6.5-8.5	5.6-7	6-10.5	6.5-10.5
%SL predorsal space	44.5-50	44-46.5	44-56	41-55
%SL upper jaw length	12.5-15	11.5-12.5	12.5-14	14.5-15
%SL lower jaw length	12-14	12.5-13	13.5-14	16.5-17
%SL anal fin base	33.5-40	38-43.5	33-38	34.5-35
%SL pelvic-anal space	15-21	16-18	16-18.5	14.5-17.5
%SL chin depth	2.5-3.5	2.2-3	2.5-3.5	3-3.5
mid-caud. ray in longest ray	4-7	3-3.5	3-4	3
chin depth in eye diam.	2.5-3.5	3-4	3-4	2.5-3
pelvic axillary scale	present	present	absent?	present
pseudobranchiae	to ½ covered	to ¼ covered	to ¼ covered	nearly all covered
pyloric caecae	long, 19-24	short, ca.38	ca.51	long, 15-19
frontal ridge pattern	"megaloptera"	"indica"	"indica"	"megaloptera"
scale striae at scale centre	overlap or continuous	separated by wide space	overlap or continuous	small or wide space
colour on sides	no dark band	dark band	faint dark band	no dark band
caudal fin margins	all dark	hind one dark	hind one dark	none dark

I. obfuscata: Limited information is available from the types only: scale striae overlap at centre; no dark band on flanks; swimbladder extensions to above 8-9th anal ray; GR 10-12+27-28; scutes 19-20+8; dorsal rays iii,13; anal rays 39-42; pectoral rays 15; scale rows 40; predorsal scales 13. (Data from Whitehead (1967) and Wongratana (1983)).

Additional comparative data are presented in Table 1.

Wongratana (pers. comm.) has drawn to my attention the relative length of the swimbladder extensions in the five *Ilisha* species possessing paired extensions: their development in *I. lunula* is usually less than for the other species. Moreover, the right hand side extension is often better developed than that on the left hand side. In the type material I dissected, the right hand side extension was longer in 65% of fish, the left extension longer in 22%, and in 13% they were of about equal length. The left hand side extension in smaller specimens (less than 80 mm SL) is frequently undeveloped (Wongratana, pers. comm.) and there is some tendency for extensions to lengthen with increase in body size (extension length matched to anal ray number opposite its termination). However, I consider the taxonomic value of this character cannot be ranked highly in preserved material because of damage to the extensions from lost elasticity, and shrinkage.

Distribution. *I. lunula* ranges from the Timor Sea near northwestern Australia, through the Arafura Sea, northern Australia, Gulf of Carpentaria, Gulf of Papua and southward along the Queensland coast at least to the Fitzroy River mouth (here based on AMS IB.1268).

Etymology. This species is named *I. lunula* in reference to its lunate, extended caudal fin.

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